Capital Improvement Assessment

March 16, 2001

INTRODUCTION

The capital improvement assessment identifies significant public and private capital improvements in the Lake Whatcom landscape planning area. The capital improvements listed are: major water supply facilities, hatcheries, roads, bridges, sewer lines, parks, recreational facilities, BPA transmission lines, and residential structures. Map U1 shows the location of these improvements. These capital improvements are listed, along with a brief description stating whether they are, or are not, vulnerable to potential hazards such as floods, debris torrents, and slope failures.

Hazardous events such as floods, debris torrents and slope failures occur naturally in the planning area. Some forest management practices and other development related activities can exacerbate naturally unstable conditions and trigger a hazardous event. The potential for a hazardous event is related to the type of geologic formation, its associated soil type, slope, deliverability (potential to deliver debris and sediment to the water), and weather related events (e.g., rain-on-snow) as well as specific forest management and development activities.

Debris has been deposited over the last 10,000 years creating alluvial fans and deltas where Austin, Carpenter, Olsen, Smith, and Blue Canyon Creeks enter Lake Whatcom. Carpenter, Olsen, Smith, and Blue Canyon Creek are identified as the most seriously affected alluvial fan hazard areas in the Lake Whatcom watershed. Lake Whatcom tributaries have an extensive history of flooding at the deltas, including occasions when large quantities of wood debris were brought down causing structural damage to homes in the area. In addition, areas associated with naturally unstable slopes or Mass Wasting Units (as identified in DNR's 1997 Watershed Analysis) have a greater potential for adverse impacts to private and public capital improvements.

WATER SUPPLY FACILITIES

There are five identified water supply facilities with water quality vulnerability in the Lake Whatcom planning area. They are water supply systems for Water District 10, City of Bellingham, Glenhaven Lakes development, Brannian Creek Hatchery, and the Bellingham Hatchery. The Middle Fork Diversion outlet, while playing a significant role in water supply, is not vulnerable to activities within the planning area..

Whatcom County Water District #10 Intake (W1)

Whatcom County Water District #10 owns, operates, and maintains the Sudden Valley Water Treatment Plant (SVWTP). The filtration plant receives its water supply from basin three of Lake Whatcom (the deepest and largest lake basin containing 96% of the lake volume) and provides drinking water for the private residential community of Sudden Valley. The SVWTP intake, constructed around 1970, lies in a protected cove southeast of Austin Creek. The intake structure is a screened 12 inch diameter ductile iron pipe supported about 5 feet above the lake bottom and located about 315 feet from the nearest shoreline at a depth of approximately 70 feet. Because of its location, the intake has limited vulnerability to fine sediments and is not vulnerable to other input variables. The introduction of fine sediments into the lake following heavy storm runoff has briefly increased lake turbidity levels and may

increase filtration costs.

City of Bellingham Intake (W2)
The City of Bellingham withdraws water from Lake Whatcom via an intake pipeline, gatehouse, and tunnel. The intake structure was built in 1940. The raw water intake is about 36 feet deep and is located about 1,200 feet offshore in basin two of Lake Whatcom. The water is conveyed from the intake structure to the shore via a 72-inch diameter wood stave pipeline. A gatehouse is located at the shore. The facility encloses a 6-foot square gate and is connected to the screen house tunnel. The tunnel length from the gatehouse to the screen house is 7,560 feet. The treatment of the water begins at the screen house.

Basin two is a shallow basin bounded by a sub-surface ridge at Strawberry Point. Due to the depth and confinement of the basin and residential runoff, water quality is currently affected by seasonally elevated temperatures, low dissolved oxygen, and increased nutrient levels. Vulnerability is limited to turbidity which could exacerbate existing water quality problems due to a low turnover rate of water in the basin. Lake level draw-downs by this intake can negatively impact the Bellingham and Brannian Creek fish hatcheries as well as fish habitat in lower stream segments.

Glenhaven Lakes Water System (W3)
The Glenhaven Lakes Club utilizes a well and reservoir water system to supply drinking water to its members. The point of withdrawal is a pump house and two wells located northeast of Cain Lake (SE1/4NW1/4, Section 32, T37N, R4E) in a residential area. Both wells are approximately 180 feet deep with the water level at approx. 150 feet. The reservoir is located approximately one mile north of the wells, about 1/3 of a mile from the northern boundary of Glenhaven Lakes, about 1 mile south of Sudden Valley, and on the east side of Lookout Mountain. It is on the side of Peak Road, on the north and east side of Ash Way. The reservoir is made of concrete, 30 feet in diameter and 30 feet tall with a capacity of 100,000 gallons. The system serves 550 residential users.

The aquifer supplying the wells is deep (150 feet) and believed to be confined. It is not likely to be influenced by local surface activities though there is a chance that pesticide and fertilizer residues could reach the aquifer.

Brannian Creek Hatchery (F1) - Two intakes are utilized by the hatchery: the primary diversion in Brannian Creek is located upstream approximately 300 yards and diverts flows of 500 gal/min., the second intake is a backup source located in Lake Whatcom at a 30 foot depth.

This hatchery is the state's primary producer of Kokanee eggs with approximately 16 million eggs produced in 1993, and 12.8 million in 1994. The eggs are distributed statewide leaving 5 million eggs for use in Lake Whatcom. Massive spawning occurs between October and December at the hatchery in a period of a few days. Water flow, turbidity, temperature, fish passage, and predation are extremely important factors during this period. Any delay in spawning may cause the Kokanee to leave the area and spawn elsewhere. In 1995, Kokanee returns to the hatchery produced only 6.6 million eggs while many Kokanee were observed spawning in Anderson Creek. Besides egg production, the hatchery raises Kokanee and rainbow trout.

The Brannian Creek intake is vulnerable to physical damage from coarse sediment and high flows that damage or block the intake structure. Turbidity, temperature, and low flows affect the quality of water diverted from the creek into the hatchery. The lake intake is used only as a backup supply when creek flows, temperature or turbidity are potentially damaging.

Bellingham Hatchery Intake (F2) - This hatchery, which produces Kokanee, cutthroat and rainbow trout, utilizes the old Bellingham water intake located in Basin one and commonly draws 2,000 - 2,700 gal/min. Because of the configuration of the buried pipe, low lake levels in the spring or fall can reduce the flows to critical levels (less than 1600 gal/min). Like basin two, water in basin one suffers seasonally from elevated temperatures, low oxygen, and elevated nutrient levels from residential runoff. Rapid increases in the lake level associated with autumn storms can create a turnover of water within the basin that has been linked to fish kills in the hatchery. Studies indicate the turnover disturbs toxins in the sediment derived from sunken mill wastes offshore at the old Bloedel Donovan mill site. The result has been a sudden drop in water pH levels and 90% mortality in trout alevin in the upper rearing troughs. Also, water temperatures exceeding 60 degrees are associated with an increase of bacteria harmful to fish. Forest practices are believed to have little effect on this intake

OTHER CAPITAL IMPROVEMENTS

Public Roads - County roads with vulnerabilities include segments within areas defined as hazard areas by the Lake Whatcom Alluvial Fan Hazard Areas Report (1992) and segments below high or moderate mass wasting hazard units (MWMU's 1B, 1C, 2, 4) The effects of a possible road failure or single blockage include total loss of access (Northshore Rd. east of Agate Bay Rd., Blue Canyon Rd.) or a significantly altered access (Park Rd.,South Bay Rd., southern portion of Lk. Whatcom Blvd., Northshore Rd.) Any major access problem affects public services such as the response time of fire, medical, and law enforcement personnel. There are numerous stream culverts and ditchline cross drains under the county roads. Whatcom Co. Engineering did not identify any significant problems with existing culvert sizing.

The following road segments have been identified as vulnerable resources.

R1 Park Rd: Entire length from Highway 9 to junction of South Bay Drive. The Road is located at the toe of MWMU 1, downslope from small areas of MWMU 1B (Moderate Hazard) and crosses numerous small streams in MWMU 1C (High Hazard). Failures have potential to block Park Road and plug culverts.

R2 Blue Canyon Rd: Segments of road across alluvial fan of Blue Canyon Creek and at seasonal stream crossings are downslope of MWMU 2 and MWMU 4 (both are High Hazard units). Road is downslope from small area of MWMU 1B (Moderate Hazard). Historically, mass wasting debris transported by streams have plugged culverts, deposited coarse sediment on roadway, or destroyed road segments.

R3 Lake Whatcom Blvd: Road segment from junction of Cain Lake Road to junction of Lake Louise Road. Road is located below areas of MWMU 4 (High Hazard)and crosses the head of an alluvial fan. Past shallow-rapid failures have blocked and damaged road and High

Bridge (B4)

R4 Lake Whatcom Blvd: Road segment on alluvial fan area adjacent to Austin creek was damaged by debris torrent in 1983 and is vulnerable to another catastrophic failure.

R5 Lake Louise Rd: The segment immediately adjacent to Austin Creek crossing is vulnerable to damage from catastrophic debris torrents.

R6 North Shore Rd: Road segment crossing Olsen Creek alluvial fan has been historically subject to damage from debris torrent originating in MWMU 4 areas upstream.

Bridges - There are 8 bridges within the watershed on public roads. Four have been damaged by previous debris torrents. The others have limited vulnerabilities to forest practices.

B1 Anderson Creek: This bridge is over a low gradient stream with limited vulnerability to coarse sediment accretion.

B2 Fir Creek: Located on a low gradient stream but below a confined channel, historically close to a debris fan, the bridge has limited vulnerability to mass wasting and coarse sediment.

B3 Brannian Creek: This bridge, located on a low gradient stream segment with a moderate transport of coarse sediment, has limited vulnerability to coarse sediment accretion.

B4 High Bridge: Located on Lake Whatcom Blvd. south of Lake Louise Rd., this bridge has a history of damage and is highly vulnerable to mass wasting and large coarse sediment damage to support column.

B5 Austin Creek: This bridge was damaged in 1983 and is vulnerable to mass wasting debris torrents and associated coarse sediment.

B6 Lake Outlet: The bridge is a wooden structure and has been identified as being vulnerable to damage from large floating woody debris.

B7 Olsen Creek: Damaged in 1983, this bridge is vulnerable to mass wasting debris torrents and associated coarse sediment.

B8 Smith Creek: Bridge has been relocated after the 1983 debris torrent event. Whatcom Co. Engineering states that the bridge is designed to pass significant debris torrents and is not vulnerable to mass wasting events.

Sewer and Water lines (S1 & S2) - Water District #10 has sewers serving the Sudden Valley development. In the 1983 storm event, debris torrents traveling down Austin Creek damaged sewer lines at the Austin creek bridge site (S1)and under Tumbling Water Dr (S2). In addition, at these same sites, water, phone and other utility lines run along the same location. They remain vulnerable to mass wasting events.

Parks (P1) - Whatcom Co. Parks has developed the old railroad grade along the north shore into a recreational trail. The trail is vulnerable to mass wasting.

Brannian Fish Hatchery (F1) - Instream structures include a fish ladder and check dam to aid in fish passage and capture. Seasonal lake level fluctuations and sediment transport through Brannian Creek have created gravel bars which can block Kokanee passage to the hatchery. This has required an annual maintenance gravel removal of approximately 40 to 50 cubic yards. Hatchery structures are vulnerable to coarse sediment and peak flows.

BPA Transmission Lines - These lines traverse Stewart Mtn. primarily along ridgetops. They are not vulnerable to mass wasting due to their location. The growth of trees adjacent to the utility right-of-way is presenting a low hazard of windthrow or timber cutting impacts to the lines and transmission towers.

BPA Powerline (E1) – A powerline is buried in the road leading to communication sites on Lookout Mountain. The powerline serves the BPA communication tower and is at varying depths making road maintenance difficult. The powerline is under a perpetual easement. The powerline is vulnerable to mass wasting events where the road crosses Austin Creek.

Sudden Valley Golf Course (P1) – An 18-hole golf course owned by the Sudden Valley Community Association. It is located on an alluvial delta formed by Austin Creek. The creek runs through the entire length of the gold course. The golf course is vulnerable to mas wasting events along Austin Creek.

Residential Structures – There are numerous residential structures along or at the mouth of most major creeks in the planning area. Those most vulnerable to hazardous events are those located at the mouth of Smith, Olsen, Carpenter, Blue Canyon and Austin Creeks and any located along these creeks. These creeks have an extensive history of debris torrents. In addition, an "un-named" creek flowing into Reed Lake as a history of debris torrents. There are numerous residential structures along this creek vulnerable to future such events.